



# Tomorrow's Performance. Today.

PROMISE Storage Solution for Cloud Datacenter

Patrick Wang  
APAC FAE Director

# PROMISE Milestones

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**TECHNOLOGY, INC.**

**2011** Introduces Pegasus, world's first H/W RAID with *Thunderbolt*. Introduces SmartStor NSx700 NAS

**2010** Introduces VTrak S3000 for Cloud Storage Solution, VTrak Ex30f and VessRAID 1840f FC RAID subsystem

**2009** Introduced VessRAID SMB Storage & SmartStor SOHO Storage & SuperTrak EX 6Gb/s RAID Controller

**2008** VTrak E-Class Chosen by Apple as Storage Solution Provider

**2007** Unveiled VTrak E-Class System & First dlina Certified SmartStor

**2006** Launched SmartStor SOHO Storage and VTrak SAS JBOD

**2005** Announced VTrak M-Class

**2004** World First HW iSCSI RAID Storage

**2003** Leads in ATA RAID for IA Server for the 3rd Consecutive Year with 83% Unit Market Share

**2002** First six-drive ATA RAID 5 controller, Listed on TSEC.

**1998** First RAID chip on MB solution

**1997** Released First ATA RAID controller DSP team founded

**1993** VESA IDE chipset captured 75% of the world's OEM market

**1991** PROMISE Taiwan established

**1988** Promise Founded in San Jose, US



# Cloud Computing and Cloud Storage



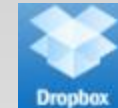
# What is Cloud Computing?

- “Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”



# Cloud Service Models

Cloud Client (PC, Mobile Devices, etc.)



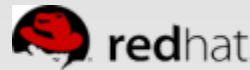
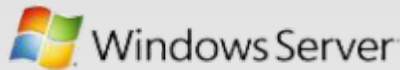
Web App

eMail

Web Storage

CRM / ERP

Applications - Software as a Service (SaaS)



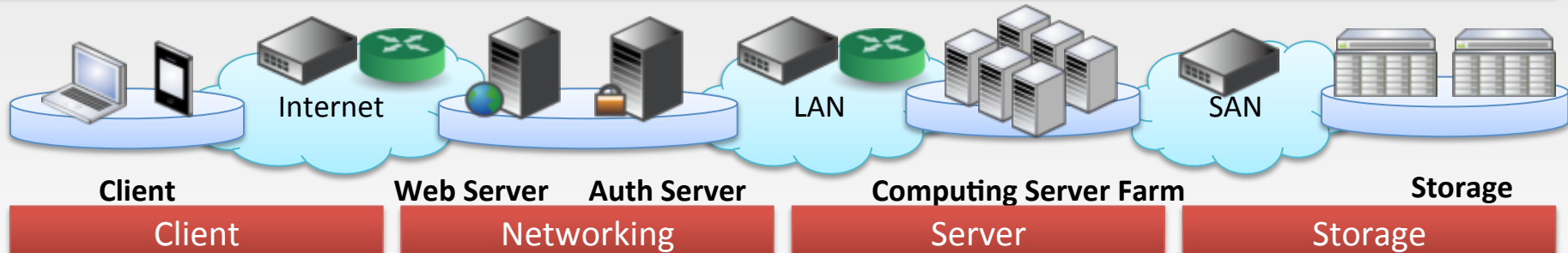
OS

DB

Middleware

Runtime

Computing - Platform as a Service (PaaS)



Infrastructure as a Service (IaaS)

# Trends that occurred in 2010

- Public Clouds were still shied away from because of security concerns
- Private clouds gained lots of momentum in 2010 and became part of the IT strategy for many enterprises.

- Private clouds will lead the way to public clouds
- Private clouds will provide the security IT admins need, but may use Public Cloud to backup
- Growth of data will continue to be explosive
  - In the past 3 years more data has been created, than all of history
- New installations of storage infrastructure will be installed with the cloud (private or public)

- Almost every laptop today ships with a backup in the cloud solution (Symantec, Mozy, Carbonite, etc.)
  - IDC Actual: 30 million in 2007, 35.5 million in 2008 , 41.1 million in 2009  
IDC Estimated: 47.5 million in 2010, 54.1 million in 2011, 61.1 million in 2012
- Facebook maintains over 500 million users and created over 350 million in a 36 month period
  - Maintains over 50 Billion images and generates over 25TB of logs per DAY!
- Photobucket handles 23M monthly unique users that upload 4 million pieces of media (photos and videos)
- Estimates indicate that over 330 million smartphones and over 42 million media tablets will be sold 2011.
- The "digital universe" will expand by almost 50%. In 2011, it's predicted that the "digital universe" — the amount of information and content created and stored digitally — will grow to 1.8ZB in 2011, up 47% from 2010, and rocketing toward over 7ZB by 2015. (IDC)
- Every 2 days, we create as much data as we did in all time since 2003 (~5 exabytes)<sup>1</sup>

<sup>1</sup>Eric Schmidt @ Technomy conference: <http://techcrunch.com/2010/08/04/schmidt-data/>

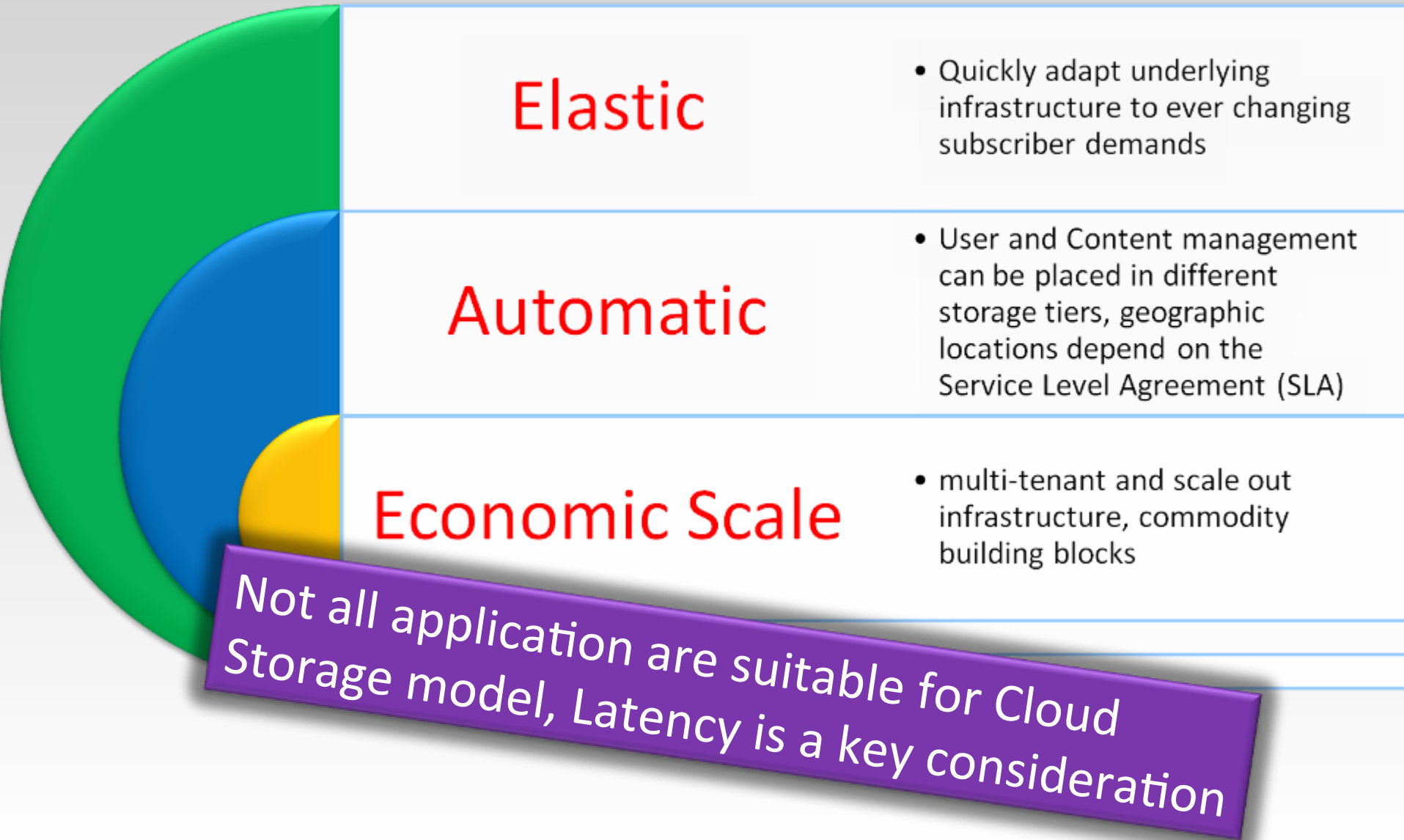
# Consumer Driven Content in the Cloud

- For every minute that passes, 24+ hours of video content is uploaded to YouTube
- YouTube has 2 billion views per day
- Hulu+, ABC, CBS, NBC, FOX are all streaming content
- There are 12 Billion devices that can retrieve TV content from the internet
- IDC estimates that 40% of large screen TVs in 2011 will have Ethernet built

# How does Storage fit into the Cloud?

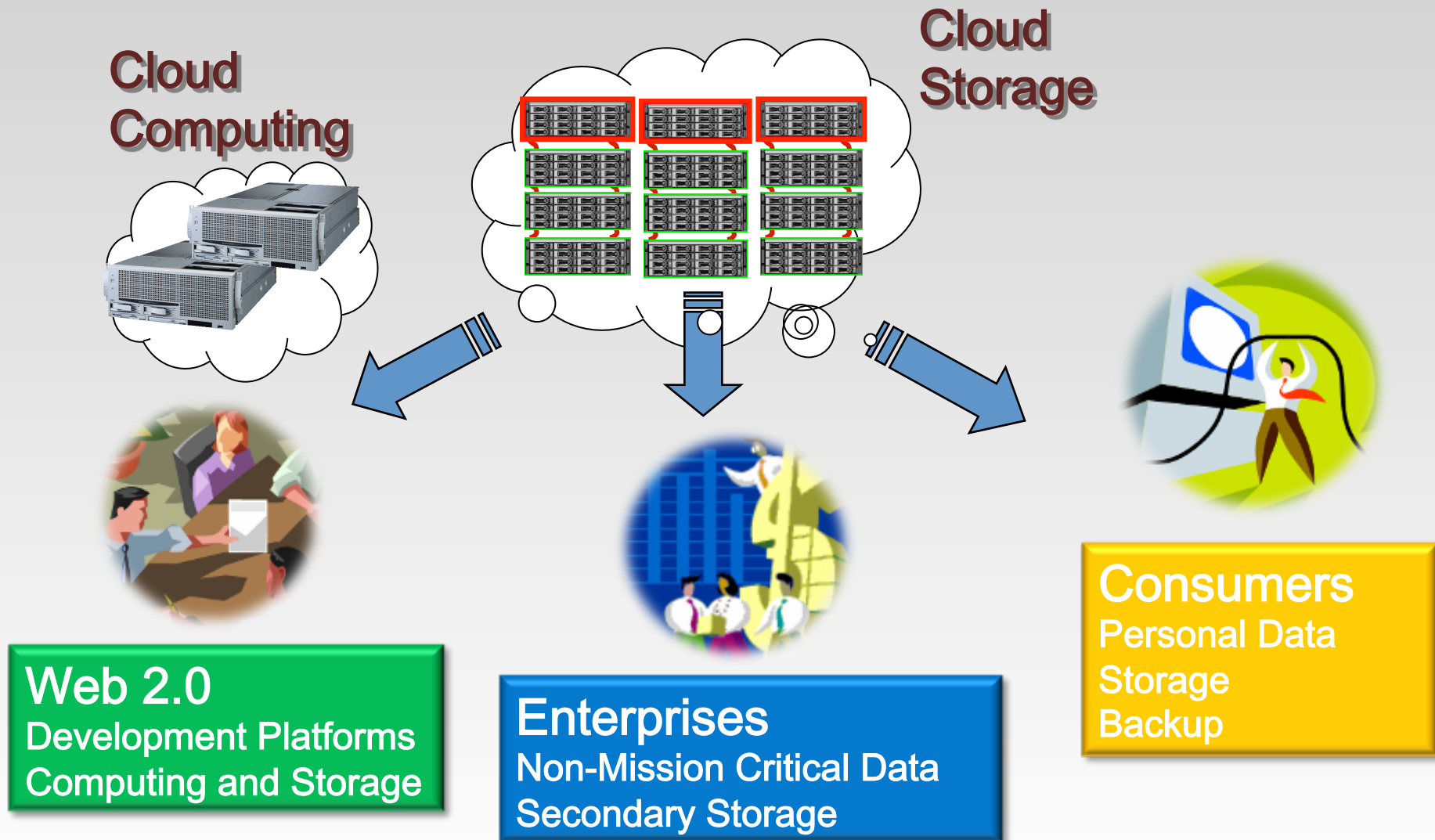
- Cloud Storage is just a subset of cloud computing
- Cloud Storage must . . .
  - Have broad network access for easy access
  - Must have rapid elasticity in capacity growth

# What are essentials in Cloud Storage?



# Cloud Storage Markets

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# What are the challenges on HCLC drives

- HCLC (High Capacity Low Cost) drives = SATA drivers
- Challenges on SATA drives
  - RVI – Poor Vibration resistance
  - Excessive Medium error and long recovery retries
  - Unpredictable behavior – e.g. time out, hang...
- Requires smart management

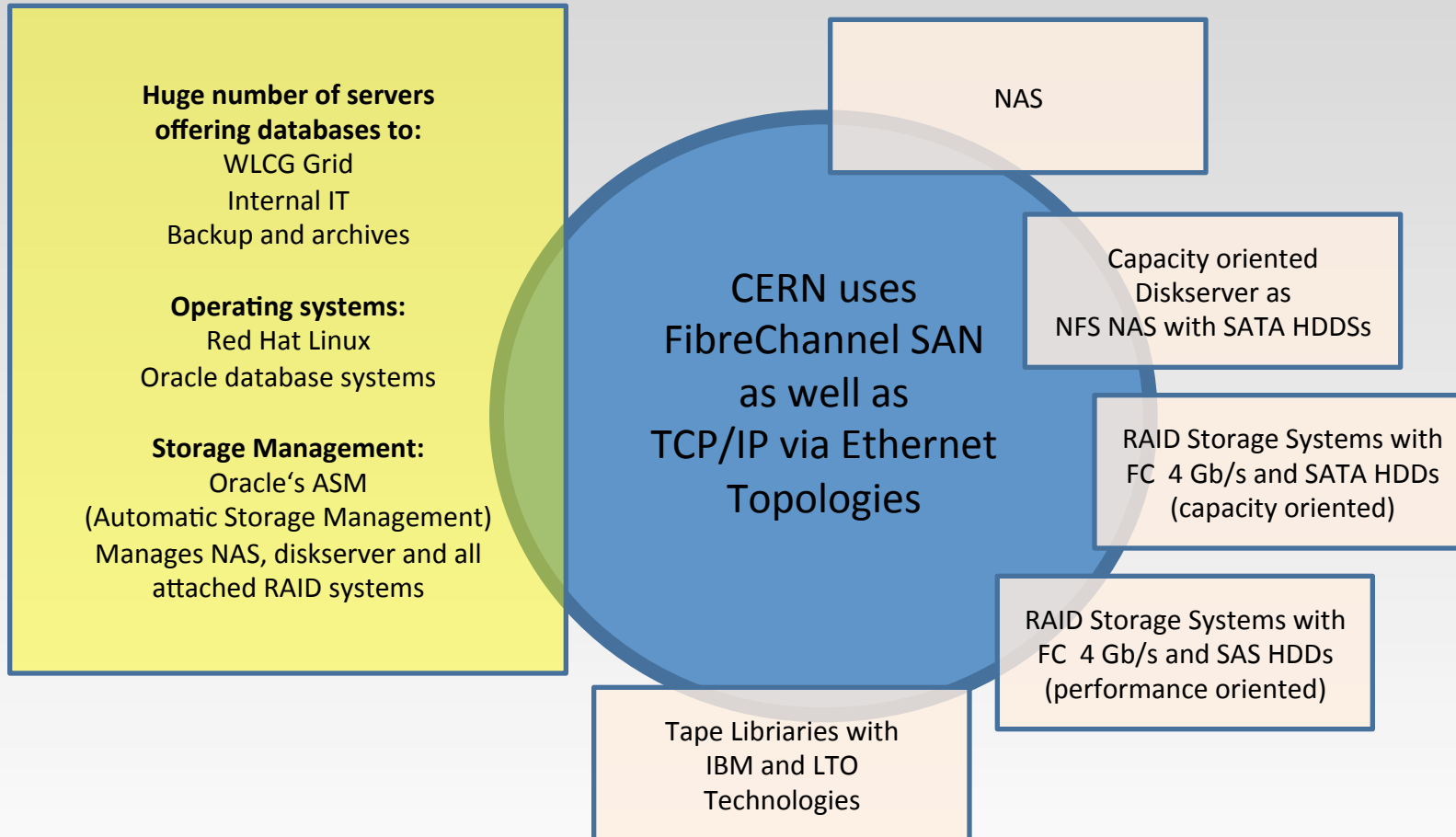
**A “Cheap” storage could become very expensive to manage.**

# What are RAID, HA and Data Services? Which are critical in Cloud Storage ?

- RAID is not just providing RAID levels but more...
  - Background activities – Media patrol, rebuild, predictive data migration
  - Robustness error handling – Manage all challenges in HCLC SATA drives
  - Performance tuning and balancing
  - Event logging and FRU identification and replacement service
  - Green Power management
- HA
  - High Availability, Redundancy paths/component, NSPOF (No Single Point Of Failure), FO/FB, Load Balancing
- Data Services
  - Utilization efficiency – Backend Storage virtualization, Thin Provisioning
  - Best practice data placement - Tiered Storage
  - Data Compression – Data Dedupe,
  - Quality of Storage service - bandwidth, latency and processing efficiency
  - Data Replications, Disaster Recovery

## New VTrak Ex30 for Cloud Storage





# VTrak Connectivity at CERN

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*Actual installed:*

*about 80 Ex10f-s with SATA HDDs = 2 PetaByte*

*about 30 Ex10f-s with SAS HDDs = 110 TeraByte*



Several Server (A- and B.Brand(  
running Ret Hat with Oracle's ASM  
(Automatic Storage Manager)

FC SAN with  
QLogic FC Switches



Capacity oriented:  
Promise Vtrak's Ex10f-single  
2 x FC 4 Gb/s  
2 GB Cache  
12-16 x SATA 2 TB HDDs  
(Western Digital)

Setting:  
Virtual JBOD  
= 1 LUN per HDD (RAID 0)  
PDM/MediaPatrol = active

Performance oriented:  
Promise Vtrak's Ex10f-single  
2 x FC 4 Gb/s  
2 GB Cache  
12-16 x SAS 300GB HDDs  
(Seagate)

Setting:  
Virtual JBOD  
= 1 LUN per HDD (RAID 0)  
PDM/MediaPatrol = active



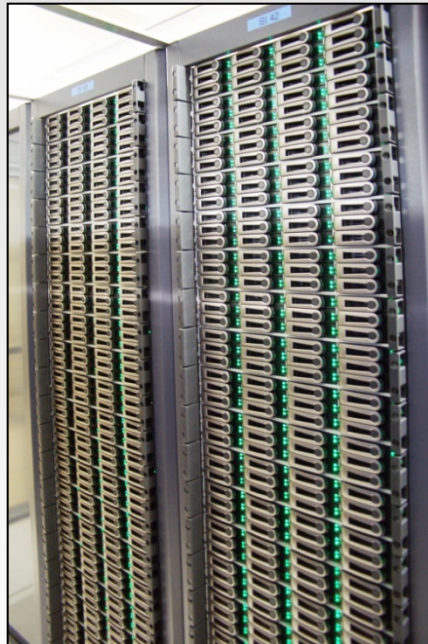
# VTrak within CERN's IT Center

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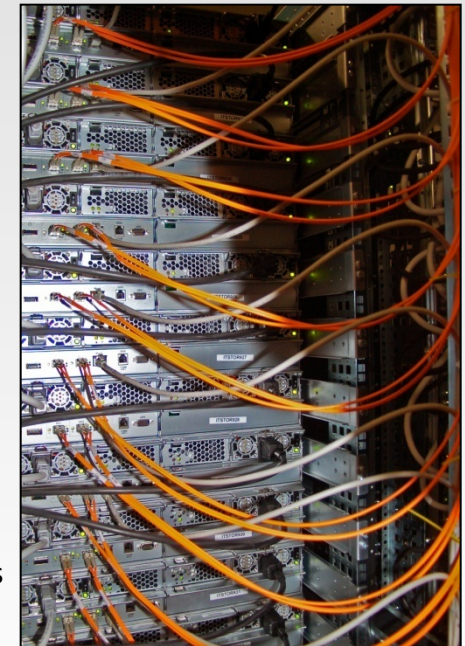
Dr. Olof Barring,  
Director CERN Central IT  
and 1 PetaByte data capacity  
within Promise's VTraks

40 x Vtrak E310f  
with 480 WD 2 TB HDDs  
offered to Oracle's ASM



Another rack with Promise's  
Vtraks offers high speed storage  
with Seagate's 300 GB SAS HDDs  
to Oracle databases

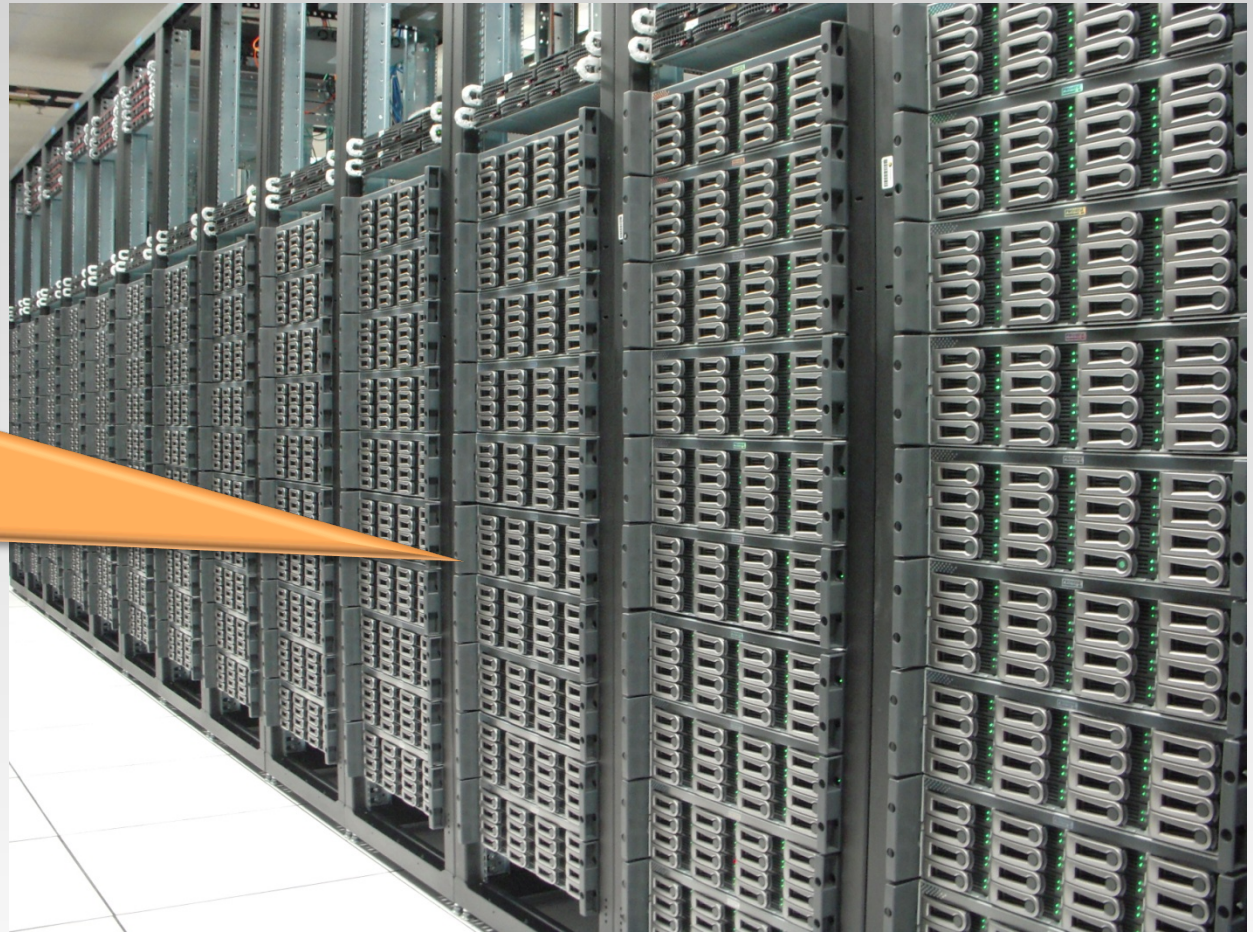
Rear side fibre channel  
connectivity to several  
Qlogic's 48port FC switches  
within CERN's main SAN



# Internet Data Center

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Installation of 7,000+  
VTrak chassis with  
110,000+ SATA drives  
totaling 70+ PB of  
storage and growing  
since 2007





# How does Intel® Xeon® Processor C5500/C3500 Series-based Platform assist in solving Cloud Storage solutions?

- Performance/watt of power has immensely grown with Intel® Xeon® processor C5500/C3500 series. Since up to a 4x performance gain can be seen, it requires less RAID head to get the same amount of work done. This is very important with virtualization platforms as such performance help makes storage consolidation possible.
- Extra CPU and Memory bandwidth has enabled the ability to scale to supporting a larger number of disks (192 with plans to increase) while giving the ability to scale the performance with the growth.



# VTrak Ex30/Jx30

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- Active/Active dual-controllers
- 8Gb FC, 6Gb SAS, 1Gb iSCSI
- 6Gb SAS or SATA HDD/SSD
- Up to 8GB cache/controller
- Expansion up to 192 drives
- Up to 384TB of raw capacity
- Embedded software management
- RAID 0, 1, 1E, 5, 6, 10, 50, 60
- LFF: 2U/12, 3U/16, 4U/24
- SFF: 2U/24
- SBB 2.0 compliant

Dual  
Controller

8G FC

12/16/24  
HDDs

7 JBOD  
Expansion

PDM

# PROMISE VTrak Features & Functionality



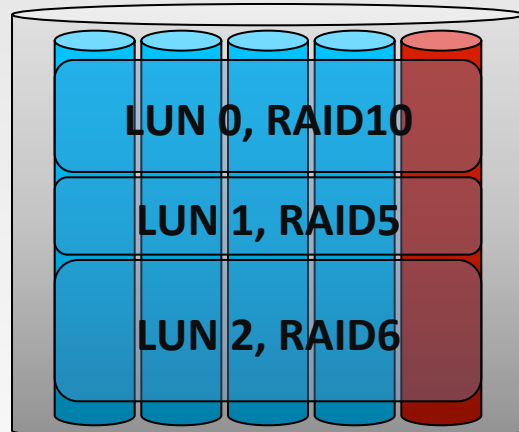
- No single point of failure
  - Redundant controllers, power supplies & cooling fans
  - Hot swappable field replaceable units minimizes downtime
- Seamless controller fail-over & fail-back
- Battery backup unit designed specifically for RAID
  - Designed to retain memory for up to 72 Hours
- UPS monitoring support
  - Protecting your data during a power outage

# Sparing Out To Prevent Rebuilds

## PDM (Predictive Data Migration)

- Avoiding costly rebuild times by detecting potentially failing disks before they fail
  - Migrate data faster to spare drive before the disk goes bad
- Criteria to trigger PDM
  - Exceed the threshold set in SMART monitor
  - Medium error report exceed threshold
  - Reassign count exceed threshold

### Under PDM process

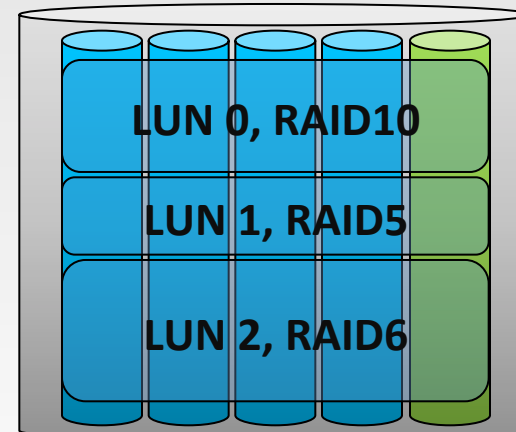


Sick Disk

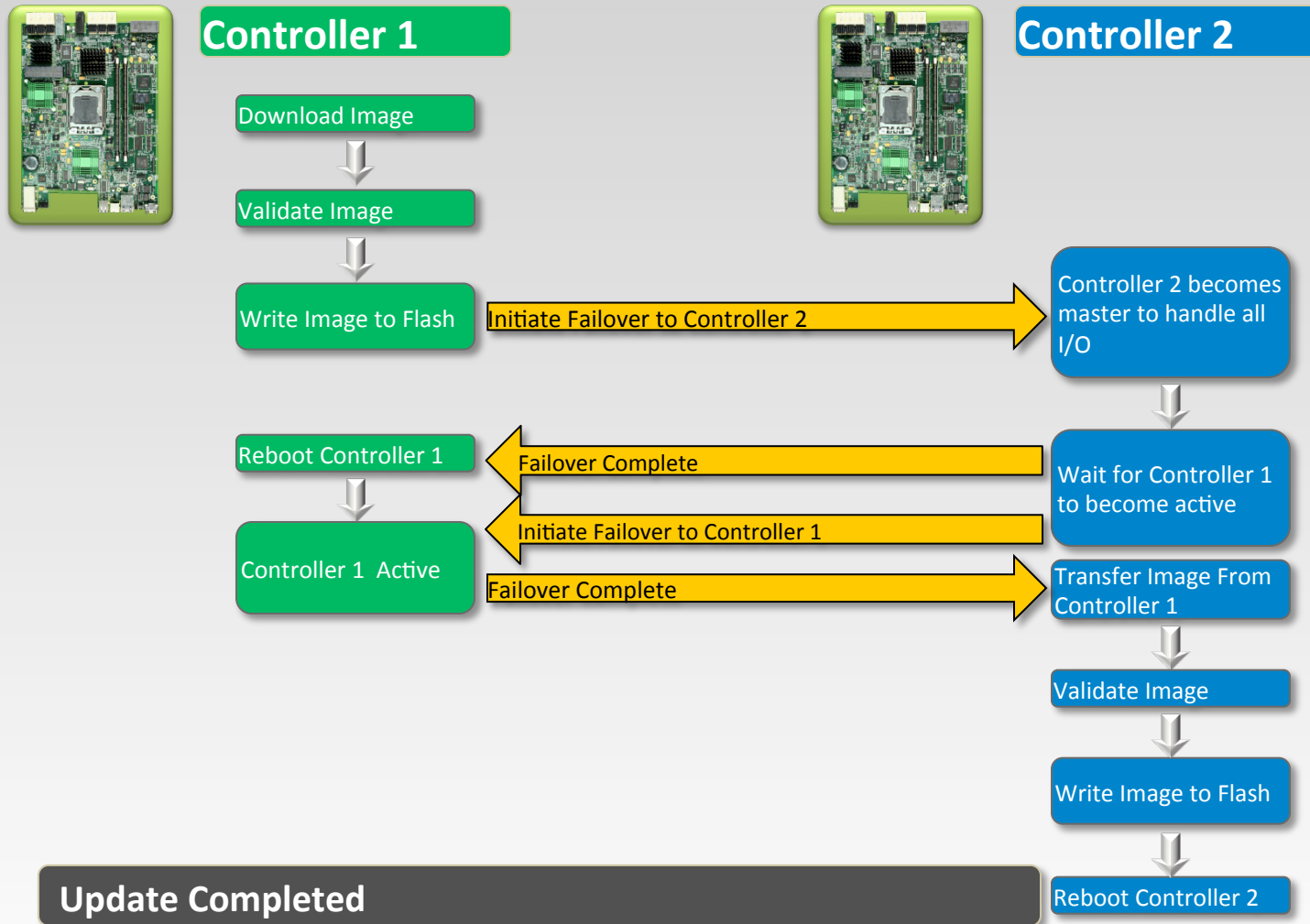


Spare

### After PDM is done

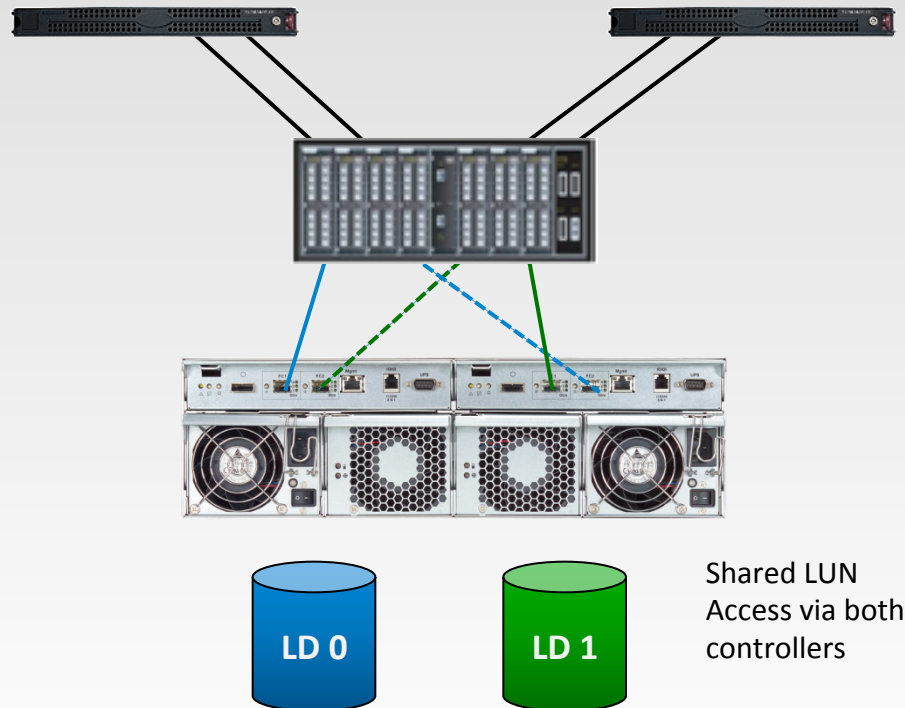


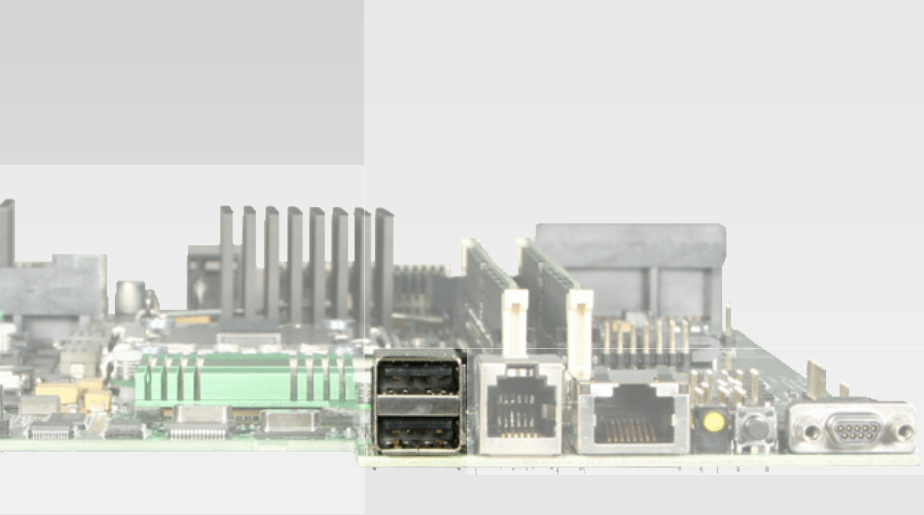
Failed Disk



# Asymmetric Logical Unit Access (ALUA)

- While in symmetric active-active mode, ALUA will allow a optimized paths and unoptimized paths to be defined





- Configuration
  - Auto-configuration using pre-defined scripts from USB Drive
- Software Update
  - Easy update of subsystem software from USB Drive
- Service Logs
  - Effortlessly store subsystem configuration, event history and other system info
- UPS Support

- What is Green Technology?
  - Green storage technology is the technology that enables energy efficiency and waste reduction in storage solutions leading to a overall lower carbon footprint
- PROMISE GreenRAID Features
  - 80Plus Bronze Certified PSU
  - HDD advanced power management (MAID 2.0)





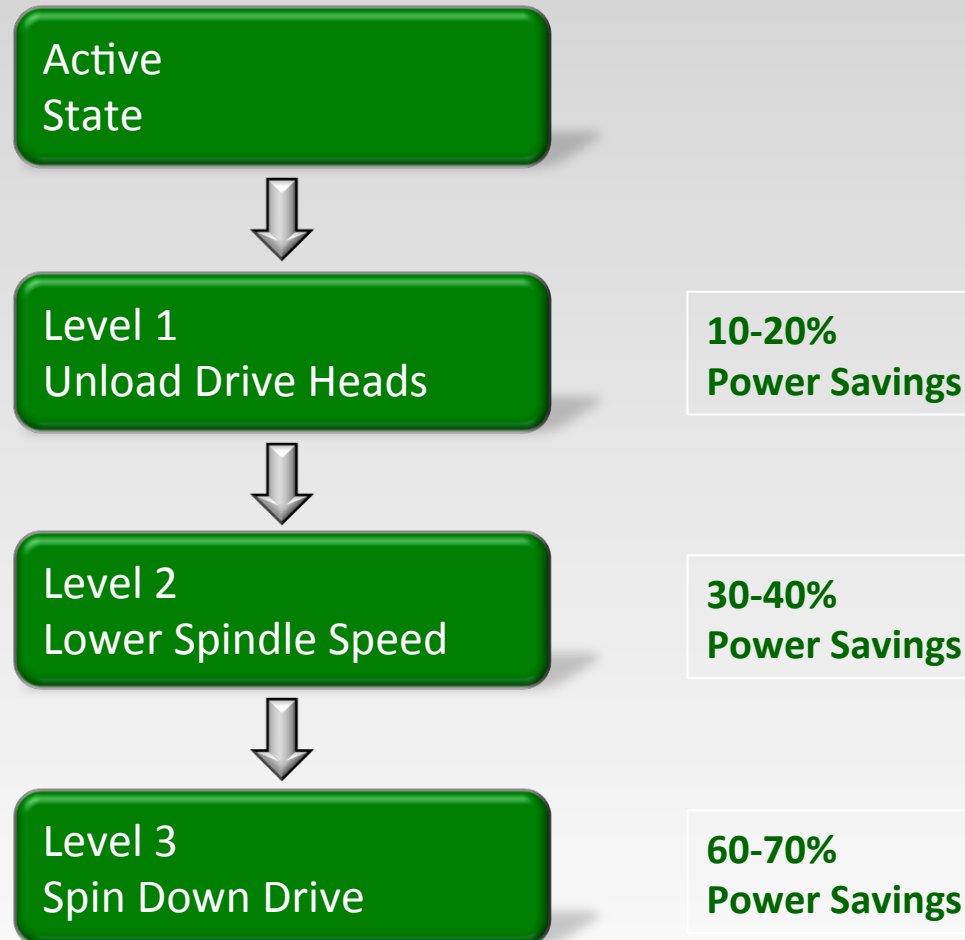
# Efficient Power Supply Units

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- 580W (3U) PSU
- 750W (4U) PSU
- Power & cooling in a single FRU
- 82% efficient @ 20% load
- 86% efficient @ 50% load

# MAID 2.0 Power Management Levels



# PROMISE's GreenRAID Story

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- Reduction of hazardous material use
  - Elimination of critically hazardous materials Pb, Cd, Br
  - Reduction of halogens
- Commitment to increase the use of recycled materials
  - Recycled products in packaging materials
- Compliance with industry standards
  - RoHS, WEEE, ISO14001, REACH
  - EITRACK membership
- GreenRAID Technology (previously discussed)
  - 80Plus Bronze Certified PSU
  - HDD Advanced Power Management



# Successful Case in Taiwan

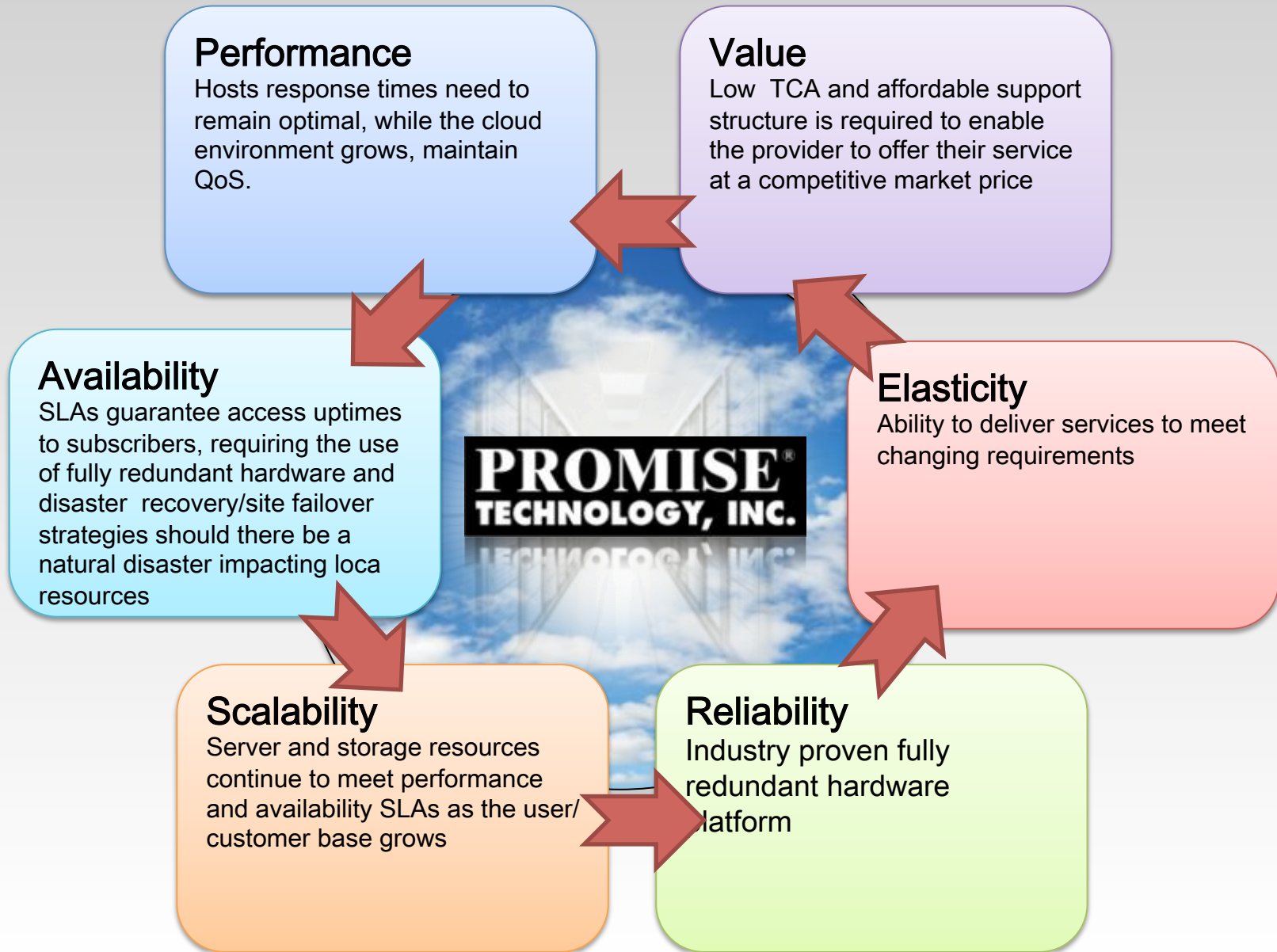
- Academia Sinica Grid Computing Center (ASGC) installed 12 sets of VTrak E830 and J830 for datacenter expansion in Q4, 2010
- Each set includes 1 x E830 + 3 x J830, providing over 5,000MB/s Sequential Read and 2,300MB/s Sequential Write performance in RAID 6 mode
- Total capacity is 2TB HDD x 1,152 = 2.3PB raw storage
- Benefits: deliver 2X performance with ½ of RAID controllers compares to existing configuration
- Excellent price/performance value and \$/GB ratio





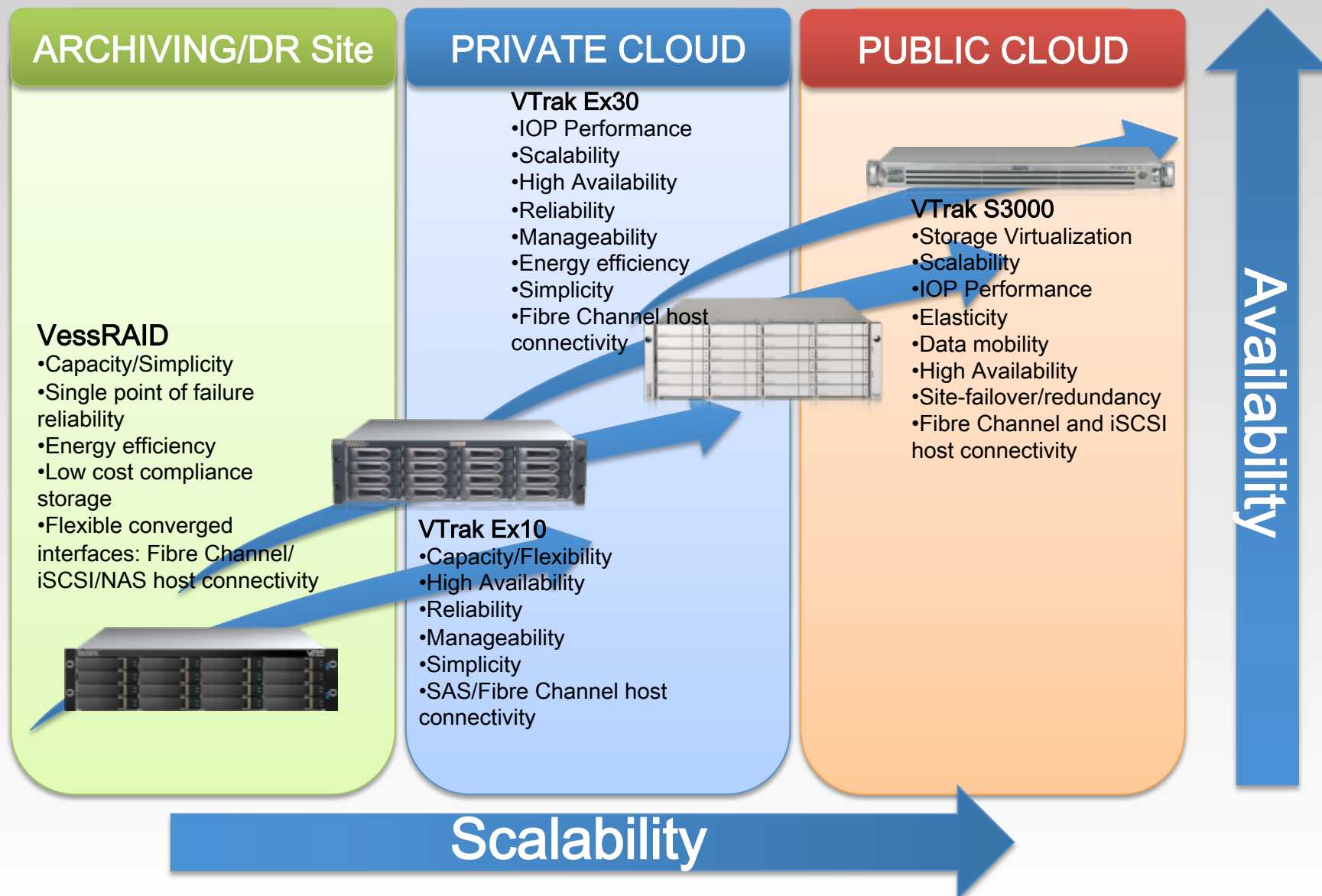
# Why PROMISE Storage?

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# PROMISE Products for Cloud Storage

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**Thank You!**